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ABSTRACT

The design and use of a departmental decision support system at Florida State University are described from the perspective of a department head. The decisions selected for study are ones of adequacy, equitability, quality, efficiency, and consistency. The complexity of the decision is related to the complexity of the support system. The major decisions the department head made were ordered from the complex to the more simple and a support system was designed to match these levels of complexity. The computer supported decision system was located in the Department of Educational Research within the College of Education. Components of the system include: requirements and decisions, decision timeframe, data considerations, and computer support. Five decisions that are supported are considered: scheduling classes, faculty assignments, graduate admissions, expense accounting, and clerical personnel classification. It is concluded that institutional researchers need to understand departmental operating cycles better and need to provide support for systems designed by departments that now have direct access to raw data and no longer depend on institutional research reports for basic information. 9 references. (Author/SW)

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The Design and use of Decision Support Systems by Academic Departments

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This paper was presented at the Twenty-Seventh Annual Forum of the Association for Institutional Research held at the Vista International Hotel, Kansas City, Missouri, May 3-6, 1987. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum Papers.

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ABSTRACT

The purpose of the paper is to describe the design and use of a departmental decision support system from the perspective of a department head and to relate the complexity of the decision to the complexity of the support system. In this case, the major decisions the department head made were ordered from the complex to the more simple and a support systems was designed to match these levels of complexity. Institutional researchers need to understand departmental operating cycles better and need to provide support for systems designed by departments who now have direct access to raw data and no longer depend on IR reports for basic information.

The Design and use of Decision Support Systems by Academic Departments

INTRODUCTION

For many years, mainframe computers have been used at the central administrative decision making levels in higher education. Expensive hardware and custom made software has been developed into a management information system which stresses data storage and routine, pre-defined reports. Recently, hardware has become less expensive and software has been packaged into flexible, inexpensive, and user-friendly systems which make possible the kind of a decision support system defined by Bennett as "A coherent system of computer-based technology (hardware, software, and supportive documentation) used by mangers as an aid to their decision making in semi-structured decision tasks (1983)."

PURPOSE

The purpose of the paper is to describe the design and use of a departmental decision support system from the perspective of a department head and to relate the complexity of the decision to the complexity of the support system.

LITERATURE REVIEW

Historically the literature on academic department management tends to focus upon the non-data based decision made by academic department heads and has stressed matters of style. The work of Alan C. Bare (1986, 1985, 1981), on managerial behavior and the recent book by Allan Tucker (1984)

discuss decisions in terms of "Linkage of Change Agents", "Ownership", and "Conflict Resolution." The 1976 issue (No. 10) of New Directions for Institutional Research which examines departmental management contains, with one lone exception, no discussion of data needs for academic departments. This literature reflects the focus of data-based information management at the central administrative levels of higher education.

Recently, a new body of literature has been developed which suggests how academic departments can make use of the new computer-based technology to assist faculty members within departments to make academic decisions. Norris and Mims (1984) suggested the use of DSS for groups of decision making; Keen and Scott-Morton (1978) suggested DSS for semi-structured tasks; Sheehan (1984) advanced the notion of an administrative system of information for electronically connected departments; and Jamieson and Mackay (1984) described the departmental workstation to cover the critical and common record-keeping functions within an academic department. These newer visions of data-based academic department management fail to describe the decision academic departments need to make, the relative complexity of the decision and the timeframe in which decisions need to be made.

DATA SOURCES

The data for this study came from an analysis of the complexity of departmental decisions support systems related to departmental actions. These data are processed at several levels within the University and then sent to the state coordinating agency to be stored on the regional main frame computer. Historical data are made available to academic departments for decisions based on curricular trends and salary standards. A disk is

down loaded each year to update five years of historical course and salary data which support decisions of assigning faculty members to courses.

APPROACH

The computer supported decision system used in this paper is located in the Department of Educational Research within the College of Education at Florida State University and has the following components: 1) requirements and decisions, 2) decision timeframe, 3) data considerations, and 4) computer support. Five selected decisions are supported regarding: 1) scheduling classes, 2) faculty assignments, 3) graduate admissions, 4) expense accounting, and 5) clerical personnel classification. The timeframe selected for this study begins in April of one year and continues through March of the following year in order to present a complete cycle. The decisions selected for this study include ones of adequacy, equitability, quality, efficiency, and consistency. Each decision requires a different support system as illustrated in Figure 1. The decisions and the support systems are ordered from complex to simple.

ADEQUACY - SCHEDULING OF CLASSES

Scheduling of classes is as important for an academic department as it is complicated because 1) the schedule represents an operational statement of the department's curriculum 2) it specifies the instructional models the department wishes to use to implement its curriculum and 3) it states how the department uses its resources. While many of the mechanics are routine, particularly in established academic departments with a traditional curriculum, any change needs to be made well in advance and usually with insufficient information.

Department Decision Support System

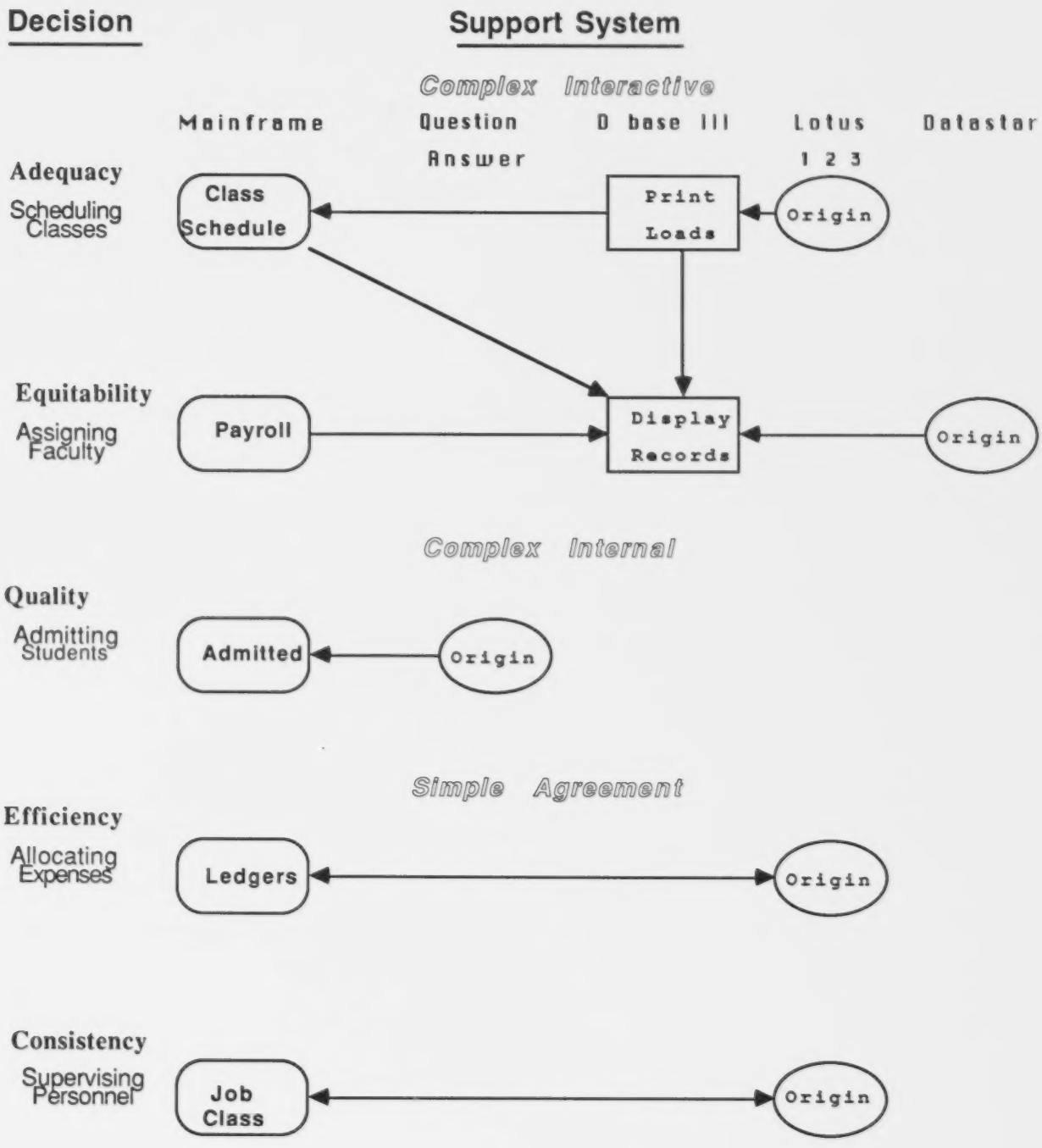

Figure 1

Requirements and Decisions.

In April, the academic department needs to 1) make final corrections in the current Spring term schedule for classes which are being taught to be sure that all instructors, rooms, times, course titles and days are complete and accurate; 2) make final adjustments in the Summer schedule of classes to be sure that faculty members have been assigned to courses within budget constraints of the Summer allocation; and 3) prepare advanced copy for the Fall schedule of classes to be sure that all courses which majors require are being offered and that there are sufficient faculty members to staff the courses. The department head must prevent course proliferation and yet allow students to meet their requirements in a flexible manner. Section size decisions carry fiscal implications in which the desire of faculty members to teach in their special area of expertise needs to be balanced against the demand for that instruction by students.

Decision Timeframe.

The department head has to distribute time among the tasks of correcting errors in the Spring schedule, checking the Summer schedule to see if the resources match the requirements and making final decisions regarding the Fall course offerings. Immediate and current actions create the most pressure and provide the fewest options. Changes in the Spring schedule, where students and faculty have already been working together for many weeks, would make an unreasonable disruption in the educational process. Summer term carries commitments to faculty for Summer employment and, while last minute changes are possible, disrupting faculty members' plans create morale problems. Decisions regarding the Fall term seem to

be distant, but needed change must be made in April to avoid problems which only become more difficult over time.

Data Considerations.

The schedule of classes contains the level at which the course is offered, the name of the course, the name of the instructor, the number of credits and an estimate of how many students will be enrolled in the course. Data on course level has implications for formula funding in that student credit hours produced in the lower division do not generate the same resources as courses taught at the graduate division. The name of the course often suggests the model of instruction as found in such courses as: Internship, Practicum, Directed Independent Study, as opposed to content courses such as: Introductory Statistics. This model of instruction is also reflected in the number of credits awarded to a particular course and when combined with the enrollment generates the basic student credit hour count needed for budget planning. Instructors need to be identified so that teaching loads can be examined and related to resource allocations. The academic departments usually operate with very limited staff support which makes it essential for the class schedule be prepared once and that editing be as simple as possible.

Computer Support.

The Department of Educational Research has three IBM XT PC computers available and a clerical staff of three people who perform all of the departments clerical activities. One computer and word processor are dedicated to the preparation of course materials and research manuscripts for faculty members. A second PC and staff assistant are dedicated to the

graduate advising, expense accounting, and personnel record keeping. A third PC and secretary are used to take overloads from either the word processing or from the administrative computer. Software systems available include: Wordstar, Datastar, Lotus, DBase III, and a Question and Answer. The configuration for class scheduling involves using the word processor and the Lotus software program to input the class schedule for the Dean's Office. Using the Lotus "translate" feature this schedule is then translating into the DBase III format and reports of individual instructor assignments are printed.

Five year course history is down loaded from the University main frame into a DBase III system which is indexed according course name so that a five year history of course enrollment and instructor can be readily accessed as a reference for planning in terms of enrollment projections for a given course or work load for a given instructor.

EQUITABILITY - FACULTY ASSIGNMENTS

Considerations of faculty work load, the assignment of responsibilities, accounting for faculty time, and evaluation of faculty effort is only a slightly less complex task for the department head. This task is more complicated when, as is the case at Florida State University, a collective bargaining agreement is in force and the department head runs the risk of time consuming and energy draining grievance procedures unless faculty assignments are made in a manner consistent with the bargaining agreement.

Requirements and Decisions.

The Florida statues, Board of Regents rules, University policy, and

the agreements between the Board of Regents and the United Faculty of Florida dictate the all faculty members shall be assigned in writing at the beginning of each academic year their duties, and responsibilities in teaching, research, and service. It is a further condition that these assignments are subject to change as the needs of the department and university demand. Any such change, however, shall be discussed with the employee and defined in writing prior to the effective date of the change. These assignments are the primary basis of annual evaluation and are reviewed cumulatively in the promotion and tenure process. Decisions on merit increases, promotion and tenure, however, are determined by the quality of performance and not solely on the fact of performance. When the department head makes decisions involving faculty assignments he or she must consider where each faculty member is in the tenure earning and promotion cycle and what specific accomplishments or products it is reasonable to expect from assigned research or service time. In the College of Education there is, addition to the instructional assignment, an assignment of research activity which is jointly signed by the faculty member and the department head which indicates not only the areas of research the faculty member will pursue during the period of assignment but also the products to be anticipated.

Decision Timeframe.

The assignment for the academic year are made during the third week in April of the preceding year. At this same time the department head is 1) making final adjustments to the current assignment of the faculty member for the current Spring teaching term caused by courses which did not make

or addition duties which have been assigned since the previous year, 2) evaluating faculty members who wish to be considered for promotion and tenure and 3) making recommendations to the Dean for merit pay or for discretionary pay increases, 4) negotiating with faculty on Summer employment adjustments based upon a demand analysis which reflects early summer registration 5) meeting individually with faculty members to review the assignment of responsibilities and adjust the teaching load to meet current demands.

Data Considerations.

There was a time in American higher education when the major concern was to see to it that all the classes the department wanted to offer could be taught by the faculty members for a particular semester. Once that obligation had been met little thought was given to what the faculty member had taught the previous term or what the faculty member would be expected to teach the next term. With the advent of collective bargaining, it became necessary for the University to maintain a file on each faculty member so that evidence could be accumulated and used in quasi legal hearings. This required the University, the College and academic departments to keep student credit hour data for not only the budget office but also for requests from the legal office.

An addition consideration involves cost accounting to determine the overhead charge for contracts and grants. Historically this was a combination of the budget data from the university budget office and the courses the faculty taught based upon the registrars records. At many institutions like Florida State a separate system has now developed, in our case called the PARS, (the Personnel Activity Reporting Service), which is

used by auditors to check faculty assignments against their contract and grant commitments. In some cases federal auditors have required that money from contracts and grants be returned because faculty members were teaching when they were assigned only to a contract or grant.

Computer Support.

In addition to the course history file described above, Datastar is used for creating the faculty assignments and for preparing the summary information required for PARS. The data are translated into DBase III file and is then combined with the general faculty files. In addition, a specially designed load calculator is used within the department at the time assignments are discussed with the faculty member. At the conclusion of the discussion an agreed upon load is printed onto the assignment form which is then signed by the faculty member and the department head. The college has a rather complicated formula which assigns 8% of the load for each credit a faculty member teaches and then portions the rest of the load among the research and service according to formulas. It is of considerable advantage to the department head to work with the load calculator since the formula are built into it. The department head must work within the formulas which reduces individual bargaining. It does, however, allow the department head to keep faculty loads consistent with the university and college requirements and provides flexibility in allocating faculty members' time.

QUALITY - GRADUATE ADMISSIONS

The Educational Research Department at Florida State University is completely a gradate program and so the admission of graduate students

becomes a central part of the operation. We receive over three hundred applications each year and select under one hundred qualified students.

Requirements and Decisions.

The requirements for admission to graduate school are controlled in part by Board of Regents requirements, part by university regulations, in part by college policy and to a large extent by departmental policy. The department head needs to be sure that bright and able students applying to the program are not lost in the mechanics in the admissions process. Many of our students come from overseas and present special problems in keeping track of records and in meeting standards established by the department. The routine nature of the record keeping becomes complex when questions of quality need to be addressed.

Decision Timeframe.

In April of the year final negotiations are taking place for students who wish to enroll in the coming Fall term while students who wish to enroll in summer term are in the process of finding major professors and establishing programs of study. Information about fellowships for the next academic year are being prepared so that the cycle of recruiting can begin in the Fall of the next academic year. Graduate admissions tends to be a year round activity and it is essential that staff be assigned on a continuing basis. We also found it necessary to have faculty members monitor the system regularly for each of the several program tracks within the academic department. It is necessary for faculty members to be able to retrieve addresses, telephone numbers of applicants and to keep track of letters of recommendation, statements of purpose,

application for fellowships and assistantships for each of the several hundred applicants at any in time.

Data Considerations.

The basic data for graduate admissions are found on the applications. Information regarding grade point averages, graduate record examination scores, etc. needs to be aggregated from time to time to assess the quality of students we accept in each program. It is important for the chairman of graduate admissions committee to know how long it takes graduate students to apply and to be admitted and to monitor faculty involvement in the encouragement of qualified students.

Computer Support.

Since the graduate admissions activity tends to be an autonomous activity a separate computer support system is used. The Question and Answer software package seems to do the job nicely for us. Its major advantage is that the format of the data collection is relatively easy to prepare. Data sorts can be made on any field and it is easy for an operator to enter data and to edit the data as that application works its way through the process. It is then possible for those who are interested in asking policy questions to use the artificial intelligence feature to summarized data in convenient forms. We have found no need to integrate this record tracking program into other on going analytic activities.

EFFICIENCY - EXPENSE ACCOUNTING

The quality of life of a faculty member and to some extent morale depends upon the judicious use of expense money. The three major

categories of expense are telephone, which takes about half of our budget, xerox, which takes a sixth, travel, which takes a sixth with supplies consuming remaining amount. There is never enough expense money to meet the reasonable demands of all the faculty members. Faculty must then decide among themselves whether they would rather wait for an open telephone line, be able to xerox course materials efficiently, or to travel.

Requirements and Decisions.

The university requires that all allocations be made within a given fiscal year. The college allocates a given amount, in the case of the Educational Research Department, $21,000, and the department head is expected to manage that money to meet the faculty needs. From one perspective this is about the same amount of money the department head has for personal expense and his own checkbook at home. The complication is that the money the faculty members spends at home requires no accountability, but the same amount of spent for the university requires complete documentation and spending within prescribed guidelines. The requirement that the money be spent within the fiscal year necessitates careful planning.

Decision Timeframe.

In April the department head is looking at an unexpended balance and obligations which exceed that unexpended balance. If the expense procedure were allowed to run its normal course the department head would probably have spent more money than was allocated. The complicating factor is that by the end of May the university may "sweep" all accounts. The

consequence of that is that while the money is allocated from July through the following June it is very likely that the faculty member will only have ten months in which to expand the funds.

Data Considerations.

In this case the data are neither complicated nor difficult to acquire. With the exception of the telephone account the department head must sign for each item of expense and some system which notes those expenditures is sufficient for the required record keeping.

Computer Support.

In this case we use the Lotus spreadsheet to track the expense and keep a running total of each item as well as an expense rate up to a given month and an anticipated spending rate for the end of the year on each item. This computer support is critical in helping the department head to track the expenditures. Unless the department head knows where the expenditures are in each of the several accounts it's very difficult to anticipate the kinds of adjustments that will need to be made in April since money allocated the following July may carry encumberances against funds swept in May. This paying of bills and sweeping of funds occurs at the university level outside of the reach or control of the academic department head. It is entirely possible for a department head to believe that a particular bill has been paid in the previous year only to find that it appears on the current years ledger. Unless there is some computer support it is virtually impossible for an otherwise busy department head to keep track of these various balances.

CONSISTENCY - CLERICAL, PERSONNEL CLASSIFICATIONS

One of the most tedious and important aspects of department administration is the matter of working with the university personnel system. For most department heads this is an alien world. The requirements of personnel have to do with the number of people supervised, time and grade, job qualifications and job descriptions which have not been a regular part of the academic life of most department heads.

Requirements and Decisions.

The requirements of personnel usually set on the shelf in thick, undecipherable, never read volumes. Yet it is important that the morale of the clerical staff remain high and that every effort be made to advance qualified people and to remove people who are not qualified. Much of the administrative activity of the department is carried on by the clerical staff and the amount of time a department head has to consider these issues hired depends on how well the department head extricates himself from the administrative detail. The clerical staff is motivated to carry some administrative burdens if they are convinced the department head understands their interests and needs regarding their classification, pay and working conditions.

Decision Timeframe.

The decision making in personnel has a timeframe in which days becomes weeks, weeks become months, and months become years. Personnel is notoriously slow in changing and slow in acting. If one wishes either to reward the excellence of an individual clerk by upgrading the

classification or wishes to remove a clerk because of incompetence a time horizon of at least a year is required. Careful documentation of daily activities related to specific assignments must be kept. Records of interviews and discussions must be collected and filed and all procedures must conform with the requirements of personnel.

Data Requirements.

The basic data units are time and task description. Job descriptions of classified positions break the day down into small percent units, 2%, 3%, 5% and associate these units with specific job descriptions. Clerks who are either to be advanced or to be removed need to maintain hourly logs of their activities preferably broken down into six minute units. While this data collection procedure is tedious and time consuming it is the only documentation acceptable to personnel.

Computer Support.

The computers in our department are equipped with sidekick which carries an hourly log for each day of activity but we found that our secretaries are not interested in using it. Each secretary simply maintains a log of the daily activities and then periodically summarizes the data using a Lotus program to sort the assigned time into the various categories and then summarize and average those times for personnel.

RESULTS

In this case, the major decisions the department head made were ordered from the complex to the more simple and a support systems was designed to match these levels of complexity. Before a decision was

assigned a level, however, it was necessary for the department head to relate decisions to other aspects of department operation so that the complexity of a decision support system could be estimated. In this case the department head viewed as complex both registration activities and related faculty assignments. Decisions regarding graduate student quality required a stand alone but expensive support system which provided artificial intelligence. The system for monitoring the efficient allocation of expense money was simply a basic spreadsheet. Tracking personnel compliance required only a program which could compute an average.

The planning year began in Summer when there were fewer students, few faculty members and fewer pressures to meet deadlines. College and university committees met less often and there were long periods of free time. This provided an excellent time to plan for major developments, to bring files up to date, to design or modify computer systems and to fine tune the assignments of faculty for the coming year. Once the Fall semester began the systems were operational and tracking the progress of the academic department with few changes and little modification. April then became a time to evaluate and to review.

IMPLICATIONS FOR IR

Institutional researchers need to understand departmental operating cycles better and need to provide support for systems designed by departments who now have direct access to raw data and no longer depend on IR reports for basic information. Unless the institutional researcher can

provide useful professional guidance related to decisions and the systems needed to support the decisions, their usefulness to the university may be seriously questioned.

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